Maths Talk

Conceptual Understanding in Numeracy

Professional Learning Pack

The pack contains six papers relating to mathematical discourse. The papers should stimulate reflection on the current level of discourse in maths lessons. Consideration is also invited of how our actions, attitudes and responses to pupils impact the culture in the classroom. Examples of conversations during maths lessons are given and practical ideas how pupil's responses can be used for the development and assessment of maths.

READING 1

What's All the Talking About?, Bernard Bagnall from nrich.maths.org

Weblink: http://nrich.maths.org/6662 (to print click 'Printable Page' link – top left)

This paper looks at the inequalities in the power structure of pupil-teacher talk in Maths lessons and suggests ways in which this communication can be enhanced by looking at teacher's beliefs regarding learning, the classroom environments they have created and in what way the pupils' contributions are valued. Listening and making assumptions are two areas tackled separately in this paper, highlighting the importance of *really listening* to exactly what the pupils are trying to communicate, especially when working out calculations. The flow diagram splits Pupil Talk into four areas: Theory of Pupils' Learning, which looks at the importance of working within Vygotsky's Zone of Proximal Development; The Effects of Beliefs; Using a Mentor; Pupil-Pupil Talk.

Reflective Questions

1. Do you agree with Vygotsky's statement that *'Teaching would be more effective if teachers were able to work in the pupil's Zone of Proximal Development'*?
2. How can better learning take place in the Maths classroom?
3. What are the weaknesses using the Initiation – Response – Evaluation model?
4. Summarise the key messages from the text.

READING 2

Private Talk, Public Conversation, Mike Askew - King's College, University of London

Weblink: http://mikeaskew.net/page3/page5/files/Privatetalkpublicconverse.pdf

Askew explores what sort of talk we might be encouraging in mathematics lessons as well as how this needs to be balanced against developing their listening in order for mathematical ideas to be played around with. He promotes two aspects to talk in mathematics classrooms – private talk in pairs or small groups and public conversation where the whole class is sharing and building ideas. Askew also gives practical examples how teachers can give a structure to this kind of talk to help embed it in classroom practice.

Reflective Questions

1. What ideas does Askew give to encourage Private Talk?
2. What are the benefits of engaging children in explaining their thinking publicly to the whole class rather than simply listing methods?
3. Do you share any of these practices or beliefs?
4. Summarise the key messages from the article.

READING 3

Let's Talk: Promoting Mathematical Discourse in the Classroom, Catherine C Stein – University of North Carolina (2007)

Weblink: http://jwilson.coe.uga.edu/EMAT7050/Students/Dwyer/mt2007-11-285a.pdf

Stein draws upon current research in her paper which looks at the implementation and management of using discourse effectively in the classroom. The paper is split into four main sections: Setting the Stage, Facilitating Discourse, Assessing Discourse and Conclusion. Classroom ethos and the messages teachers send students is also discussed as this has an impact on the level of discourse which will be achieved. Transcripts of conversations between teacher and pupil are within the paper to give examples of how discourse can be developed. A table for teachers to self-evaluate their level of discourse is also included.

Reflective Questions

1. What are the key features of a classroom supportive of discourse?
2. Can you think of low-press and high-press examples in the cognitive discourse during last week's Maths lessons? How could the low-press examples have been improved?
3. What are the benefits of ensuring there is supportive motivational discourse in your class?
4. Summarise the key messages from the text.

READING 4

Mediation and Interpretation: Exploring the Interpersonal and the Intrapersonal in Primary Mathematics Lessons, Mike Askew - University of London (2004)

Weblink: http://www.emis.de/proceedings/PME28/RR/RR209_Askew.pdf

In this paper, Askew looks at separating observable aspects of a typical Maths lesson into Tasks, Artefacts, Talk and Actions with Activity, Tools and Images being added as interpretive parameters of these. One observed lesson is looked at to consider how, despite all the children being given the same task, the pupils are actually engaged in different activities and are using different artefacts to help them. This highlights the importance of maths talk in order to share their understandings with both their peers and the teacher assessing.

Reflective Questions

1. Why is it necessary to work with both the participation and internalised models/positions?
2. Do you agree with Askew's four reasons why talk has been considered separately from artefacts? Why?
3. Reflect on your current practice. Have pupils been engaged in the same *task* but may have been engaged in different *activities*?
4. Summarise the key messages from the text.

READING 5

Primary Pupils in Whole-Class Mathematical Conversation, Thérèse Dooley - University of Cambridge and St Patrick's College (2009)

Weblink: https://bsrlm.org.uk/wp-content/uploads/2016/02/BSRLM-IP-29-1-08.pdf

Dooley's paper looks at the structure of classroom interaction, explaining the differences between the Initiation – Response – Follow-up and Initiation – Response - Evaluative models and how a participatory model of discourse may be developed in maths. A fully coded transcript of a maths lesson is included allowing the reader to observe both the pupils' responses, which type of follow up questions the teacher used and reflect on the balance between negative and positive elements of risk. This balance is key for new mathematical insights to be constructed and for children to experience playing a significant role in the solution process.

Reflective Questions

1. Which model of interaction is most frequent in your Maths lessons – I-R-F, I-R-E, 'uptake' with 'focusing' or 'revoicing'? Which of the five 'follow-up' categories do you feel aligns with your current practice?
2. How would you explain 'revoicing' to your class and its importance?
3. Do you agree that, by having a mathematical conversation dominated by 'press' and 'maintain' moves, this allowed for the greatest opportunities for the students to engage with each other's ideas?
4. Summarise the key messages from the text.

READING 6

Chapter 3 – Whole Class Teaching in Teaching Number: Advancing Children's Skills and Strategies (2nd Edition), Robert J. Wright, Jim Martland, Ann K. Stafford, Garry Stanger - SAGE Publications (2002) – Green Book

This chapter looks at how to manage whole class teaching and the classroom to foster a mathematically rich learning environment. Classroom discourse is a separate heading within the chapter but communication within maths, both verbal and written, is mentioned throughout as this is a key feature of a stimulating classroom. Other topics include: the teaching and learning cycle; continuous assessment as well as giving outlines of what whole class lessons may look like.

In the Classroom Discourse section it is advised that explanation and discussion of the solutions becomes part of the routine of whole-class teaching ensuring that the teacher is not simply a 'transmitter of knowledge'. Children's responses, teacher's beliefs and notation are also looked at in more depth.

Reflective Questions

1. To what extent do you agree with the constructivist view of teaching and Yackel et al's statement on p49?
2. Which mode of teaching do you feel aligns with your current practice – transmission or discovery learning?
3. What is the importance of legitimising some pupil's strategies and de-emphasising others?
4. Summarise the key messages from the text.